



General Service Centrifugal Pump

Line :	Mega
Version:	Bloc

1. Application

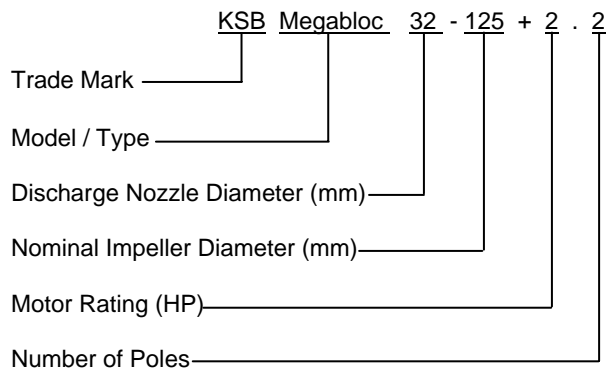
The KSB Megabloc pump is designed for pumping clean or turbid liquids and it is mainly used in:

- Water supplies for industries
- Irrigation
- Circulation of condensates
- Building Trade Centers
- Air conditioning
- Cooling services

2. Design

Horizontal, single stage, end suction with top centerline discharge, close coupled to electric motor.

3. Designation



4. Operating Data

Size	: 1" to 6" (DN 25 up to 150)
Flow	: to 2200 gpm (500 m ³ /h)
Head	: to 426 ft (130m)
Temperature	: 194 °F (90°C)
Maximum suction pressure	: 43 psi (3 bar)
Maximum discharge pressure	: 190 psi (13 bar)
Speed	: to 3.600 rpm

5. Introduction

KSB has supplied you with equipment that has been designed and manufactured with the most advanced technology. Due to its simple and tough construction it will not need much maintenance. With the aim of providing our clients with a satisfactory, trouble free operation, we recommend to install and care our equipment according to the instructions contained in this service manual.

This manual has been prepared to inform the end user about the construction and operation of our pumps, describing the adequate procedures for handling and maintenance. We recommend that this manual should be handled by the maintenance supervision.

This equipment should be used in the operational conditions for which it was selected as to: flow rate, total head, speed, voltage, frequency, and temperature of pumped liquid.

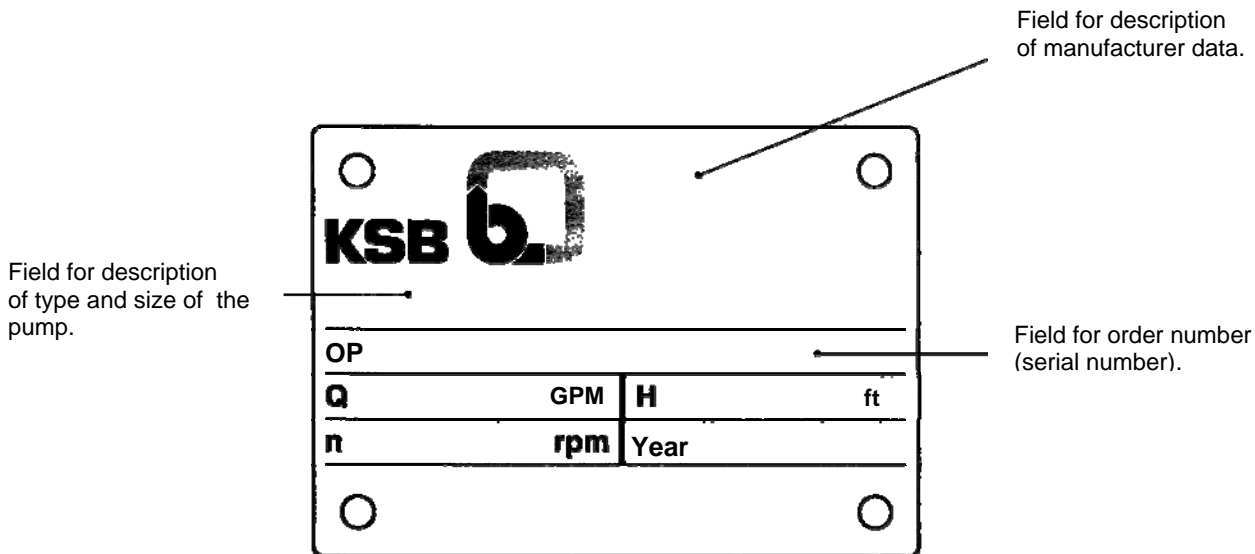


Fig.1 – Nameplate

For requests about the product, or when ordering spare parts, please indicate the type of pump and the Production Order n° (serial n°). This information can be obtained from the nameplate on the actual pump. If the nameplate is not available, the PO n° is engraved in low relief on the suction flange, and on the discharge flange you may find the impeller diameter.

Attention: This manual contains very important instructions and recommendations. Its careful reading is an obligation before installation, electrical connections, first starting and maintenance.

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6. General Information

6.1. Equipment Inspection

Inspect the equipment as soon as it has been received. Check it with the information contained in packing label and inform immediately KSB or its Representative of any irregularities found, such as damaged or missing parts.

6.2. Storage

Protect KSB Megabloc from physical damages, humidity, dust and aggressive environments.

6.3. Description

Casing:

Single volute, with top centerline discharge.

Suction and discharge are flanged (ANSI B16.1 250 # FF for sizes 40-250, 50-250, 50-315, 65-250, 80-250, and ANSI B16.1 125 # FF for the others sizes). The casing is fixed to the discharge cover/adaptor in such a way to assure a perfect alignment.

Radial split casing with back-pull-out design, which allows the pump disassembly without dismounting the suction and discharge pipelines.

Standard material - Cast iron

Optional material - Stainless steel

Impeller:

Single suction closed, radial flow impeller directly driven by the motor shaft. It is a one-piece casting, keyed and bolted to motor shaft.

Standard material - Cast iron

Optional material - Stainless steel

Adapter / Discharge Cover:

It assures the alignment of the pump casing to motor flange.

Standard material - Cast iron

Optional material - Stainless steel

Mechanical Seal:

Standardized for use with water to 194 °F (90°C), as well as for most hydrocarbons. For others temperatures and liquids, please consult KSB.

Standard material - Carbon / Stainless steel or Ceramics / Stainless steel.

Optional material - Tungsten carbide / Tungsten carbide

Shaft Protecting Sleeve

Extended, covering the shaft sealing area, preventing the contact of the pumped liquid with the shaft.

Standard material: Stainless steel

Optional material - AISI 316

Electric Motor:

Supplied as an integrating part of the set. Nema MG 1 Motors with JM / JP shaft. Motor efficiencies according to Epact. Ball bearings are dimensioned to withstand radial and axial loads acting over them. The set is supported by motor feet.

Protection Degree : TEFC/ IP55

Insulation Class : F

Service Factor : 1.25

Rotative Speed : 3,600 rpm / 1,800 rpm

Phases / Frequency : 3/ 60 Hz

Voltage : 208 - 230 / 460 V (also available in 575V for Canada)

7. Piping

The perfect operation of a pump depends on dimensions and correct arrangement of piping to be used.

The suction and discharge piping lines shall be supported by suitable means. This way, mechanical efforts are prevented to be transferred to pump nozzles.

Avoid support piping lines on pump nozzles

7.1. Suction Piping

The suction piping shall be dimensioned according to the following criteria:

- Diameter size should never be smaller than the suction nozzle size.
- Maximum liquid speed: 6.56 ft/s (2 m/s).
- Install piping as straightest and shortest as possible.
- In case of negative suction, install piping in slope towards the pump.
- Try to minimize the pressure losses at the suction piping and respective accessories (valves, curves, reductions, strainer, etc.).
- Avoid the making up of air pockets caused by siphons, concentric reductions, etc., when laying out suction piping; specially in case of negative suction.

7.2. Discharge Piping

The discharge piping shall be dimensioned taking into consideration the following criteria:

- a) Economy:
 - Investment of KSB Megabloc.
 - Investment of piping and its relevant accessories.
 - Amortization time of investment.
- b) Technical
 - Maximum recommended speed: 16.4 ft/s (5 m/s).
 - Install a check valve after discharge nozzle.
 - Prevent air pockets making up in piping. If that is not possible, the highest piping points shall be provided with an air vent device to facilitate air outlet.

7.3. Typical Installation

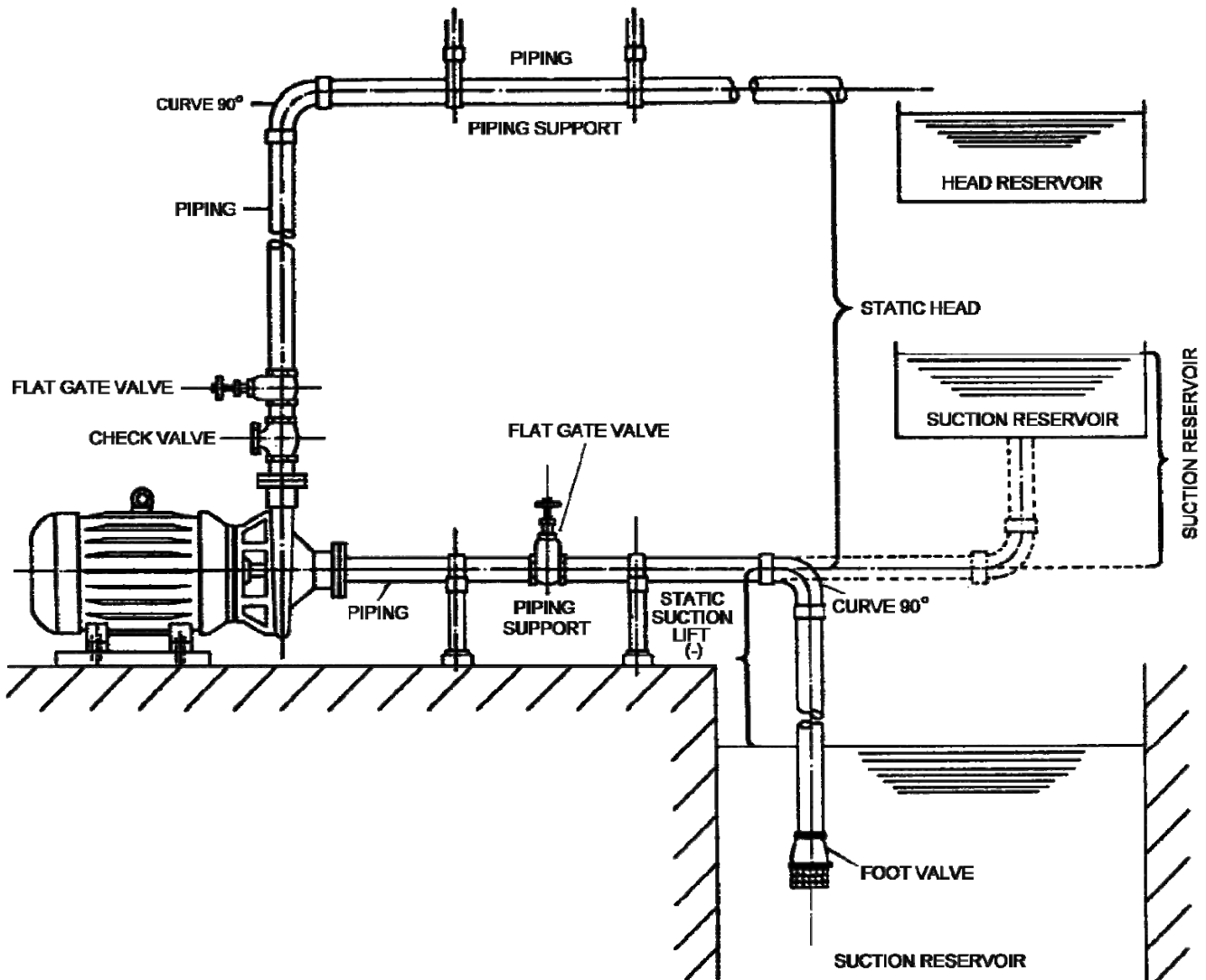


Fig. 2

8. Installation

A poorly performed assembly will result in operation disturbances, causing vibrations and early wear on internal parts. Preferably KSB Megabloc shall be assembled on a concrete foundation or over a metallic base with flat surface on the fastening area. The fastening will be performed through 4 screws on the electric motor feet.

NOTE: For pumps with flanged suction and discharge connections, the pump casing will be equipped with feet. Fastening to base however should be performed through the 4 screws on the electric motor feet.

8.1. Installation Availability

Before placing KSB Megabloc on installation site, turn its shaft and see if it is turning freely. After fastening and installing the suction and discharge piping, check again if shaft is still turning freely. Be sure that piping lines are not transferring stresses to the pump nozzles.

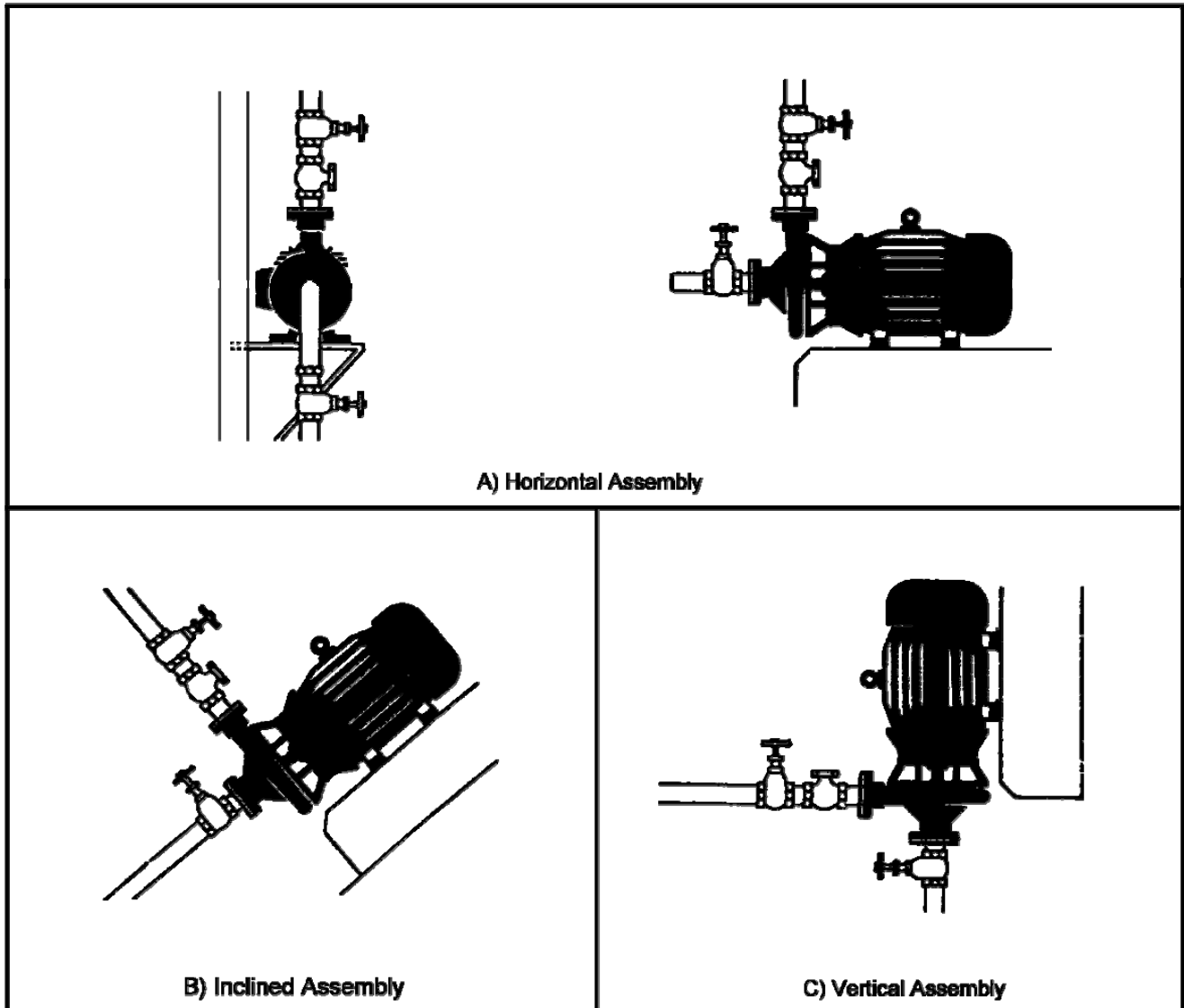


Fig. 3

9. Starting

The bellow procedures must be followed to start the KSB Megabloc.

9.1. Priming

Before starting up it is necessary to fill completely the suction piping and the pump with liquid. This operation is called priming and it can be made by using one of the following methods:

- If the liquid level on suction reservoir is above the pump suction nozzle, you only have to open the suction and discharge valves and let the liquid flow by gravity until complete filling of pump.
- When the liquid level in suction reservoir is at suction nozzle elevation or below it and suction piping is equipped with a foot valve, both pump and piping shall be primed by using one of the following methods:
 - Remove plug (part n° 916.2) and install a priming funnel (with valve) in its place. After opening the suction valve fill with the liquid to be pumped through the priming funnel until filling completely the pump and suction piping. When the operation is completed, close the funnel valve.
 - When an external source of liquid to be pumped is available, a permanent connection piping with valve shall be adapted, as well as also provided an air vent just after discharge nozzle and before any valve, allowing air release. Priming is carried out by opening the external source valve and letting the liquid flows until pour out through the air vent. Once the priming is performed, close the air vent and also the external source valve.
- Other priming methods may be used depending on the installation location availability. Most of these methods are based on the creation of a differential pressure between suction piping, the pump and the discharge piping, being used mainly when there is not a foot valve available.

9.2. Preparation for Starting

- Open totally the suction valve.
- Close the discharge valve
- Prime the pump and suction piping (see item 9.1).

9.3. Start-up

After the above steps have been done, start the motor for a very short time and switch it off observing whether the rotation direction is identical to that one indicated on the pump casing.

Once checked the rotation direction, switch on the motor and let it reach its full speed. Then open slowly the discharge valve. The pump cannot operate with discharge valve closed after the motor reach full speed, for more than a few minutes.

CAUTION: NEVER OPERATE A DRY PUMP

10. Operation

At the start-up the pump mechanical seal may leak a little. Such a leakage should cease after accommodation of sealing surfaces.

The pump running should be soft. In case of operation difficulties, refer to item 12.

11. Shutdown Procedure

To shutdown KSB Megabloc pumps, below procedure should be followed:

A - Close the valve on discharge side.

B - Switch of the electric motor.

12. Operation Abnormalities and Troubleshooting

12.1. Abnormalities

Abnormalities	Probable Causes
- Pump does not pump or pumped flow is insufficient	01- 02- 03- 04- 05- 06- 07- 08- 09- 10- 11- 12- 15- 16- 17
- Pump stops delivering liquid start	01- 02- 03- 04- 05- 06- 07- 08
- Insufficient discharge pressure	01- 02- 03- 04- 05- 07- 09- 10- 11- 12- 15- 16- 17
- Electric motor overloaded	11- 13- 14- 15- 16- 19- 20
- Leakage on mechanical seal	12- 18- 19- 20- 22- 24- 25- 26
- Reduced mechanical seal life	01- 18- 19- 20- 21- 22- 23- 24- 25- 26
- Vibrations / Noises	01- 02- 04- 11- 12- 17- 18- 19- 20- 21- 27- 28- 29- 31- 32
- Overheating	01- 02- 03- 10- 13- 18- 19- 20- 27- 30- 32

12.2. Probable Causes

- 01 - The pump has not been primed or priming was poorly done.
- 02 - The installation requires a suction condition better than the present one (available NPSH is lower than required NPSH).
- 03 - Excessive suction slope.
- 04 - Air pockets in suction piping.
- 05 - Air is leaking into suction piping
- 06 - Suction valve closed or partially opened.
- 07 - Foot valve too small or clogged
- 08 - Suction piping is not sufficiently immersed.
- 09 - Rotation in reverse direction
- 10 - Total head higher than that one informed by occasion of selection.
- 11 - Foreign bodies on impeller.
- 12 - Excessive wear of internal parts.
- 13 - Electric motor operating in two phases.
- 14 - Total head lower than that one informed by occasion of selection.
- 15 - Liquid viscosity is different of the one informed by occasion of selection
- 16 - Liquid density is different of the one informed by occasion of selection.
- 17 - Damaged or worn out impeller
- 18 - Warped shaft.
- 19 - Friction of rotating parts with stationary parts.
- 20 - Damaged or worn out bearings.
- 21 - Misalignment due to forces or expansion of piping lines.
- 22 - Mechanical seal assembled incorrectly.
- 23 - Abrasive elements in pumped liquid.
- 24 - Shaft protecting sleeve worn out.
- 25 - Internal misalignment of parts restraint stationary seat to accommodate with mechanical seal rotary seat.
- 26 - Mechanical seal has operated dry.
- 27 - Operation with reduced flows.
- 28 - Set fastening is not sufficiently steady.
- 29 - Lack of lubrication on bearings.
- 30 - Excessive grease on bearings.
- 31 - Impurities on bearings or on lubricant.
- 32 - Oxidation of bearings due to liquid contamination.

13. Disassembly

Before starting disassembling KSB Megabloc pumps, identify first in which of the two assembly figures (item 15) it fits. For a better identification we describe below both possible disassembly sequences.

13.1. KSB Megabloc up to 15 HP, 2 pole motors and up to 60 HP, 4 pole motors

1. Remove the 4 screws that are fixing the electric motor to foundation.
2. Remove the screws (900.1), which are fixing the casing (102) on discharge cover (163).
3. Separate the set from the casing.
4. Hold the impeller (230) to keep it from turning and remove impeller screw (906) and the flat gasket (400.3), so you can remove the impeller.
5. Remove the shaft protecting sleeve (524) together with mechanical seal parts (433) mounted on shaft protecting sleeve.
6. Remove the discharge cover (163) by removing screws (901.2), which are fixing it to electric motor (801).
7. Remove the mechanical seal part (433) that is fixed on discharge cover (163).

13.2. KSB Megabloc over 15 HP, 2 pole motors

1. Remove the 4 screws that are fixing the electric motor to foundation.
2. Remove the screws (900.1), which are fixing the casing (102) to adapter (145).
3. Separate the set from the casing.
4. Hold the impeller (230) to keep it from turning and remove impeller screw (906) and the flat gasket (400.3), so you can remove the impeller.
5. Remove the shaft protecting sleeve (524) together with mechanical seal parts (433) mounted on shaft protecting the sleeve.
6. Remove the discharge cover (163) fixed on adapter (145).
7. Remove the mechanical seal part (433) fixed on discharge cover.
8. Remove the adapter (145) removing screws (901.2) that are fixing it to the electric motor.

14. Assembly

The assembly of KSB Megabloc is the opposite of disassembly described above, but some precautions are necessary:

1. The mechanical seal contact parts should be lubricated with some fine oil (SEA 10 or SAE 20) or pure Vaseline.
2. Clean all pieces.
3. Use a new set of gaskets at each assembly.
4. When placing the flat gasket (400.2) on casing (102) it is advisable, for a better fitting, that some grease or oil is put on the contact region of casing with gasket.

Once finished the assembly, turn the shaft and check if it rotates freely. Otherwise, disassemble the pump and reassemble it. Should the problem remain, refer to nearest authorized dealer.

15. Exploded View

15.1. KSB Megabloc with 2 pole motors up to 15 HP and 4 pole motors up to 60 HP.

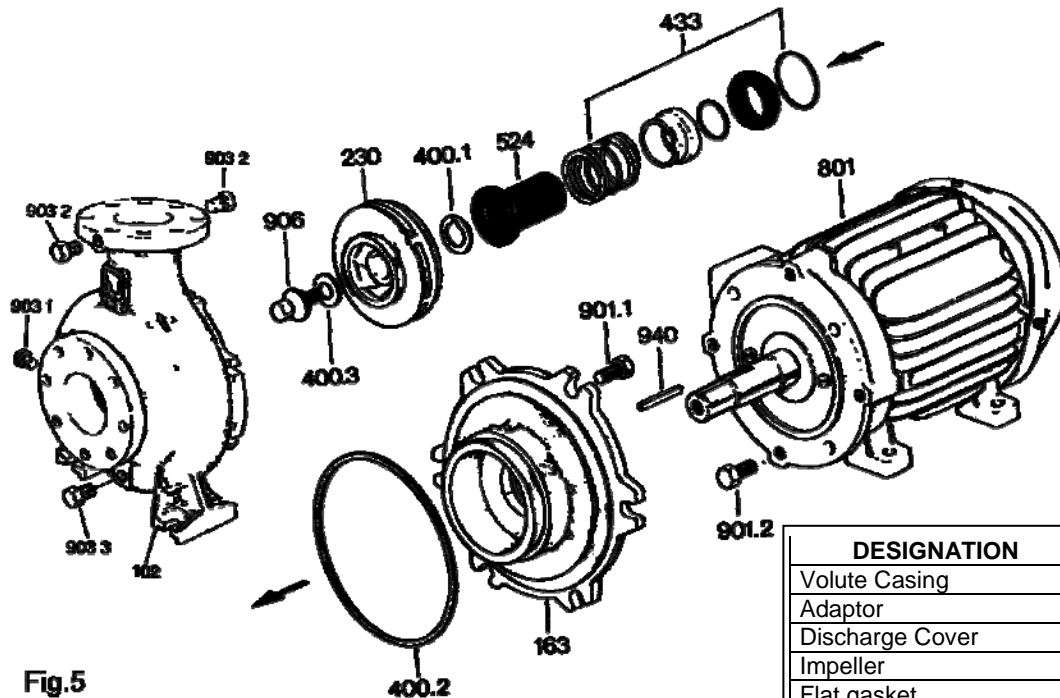


Fig.5

15.2. KSB Megabloc with 2 pole motors over 15 HP.

DESIGNATION	PART N°
Volute Casing	102
Adaptor	145
Discharge Cover	163
Impeller	230
Flat gasket	400.1/2/3
Mechanical Seal	433
Shaft Protecting Sleeve	524
Hexagon Head Bolt	901.1/2
Threaded Plug	916.1/2/3
Impeller Screw	906
Key	940

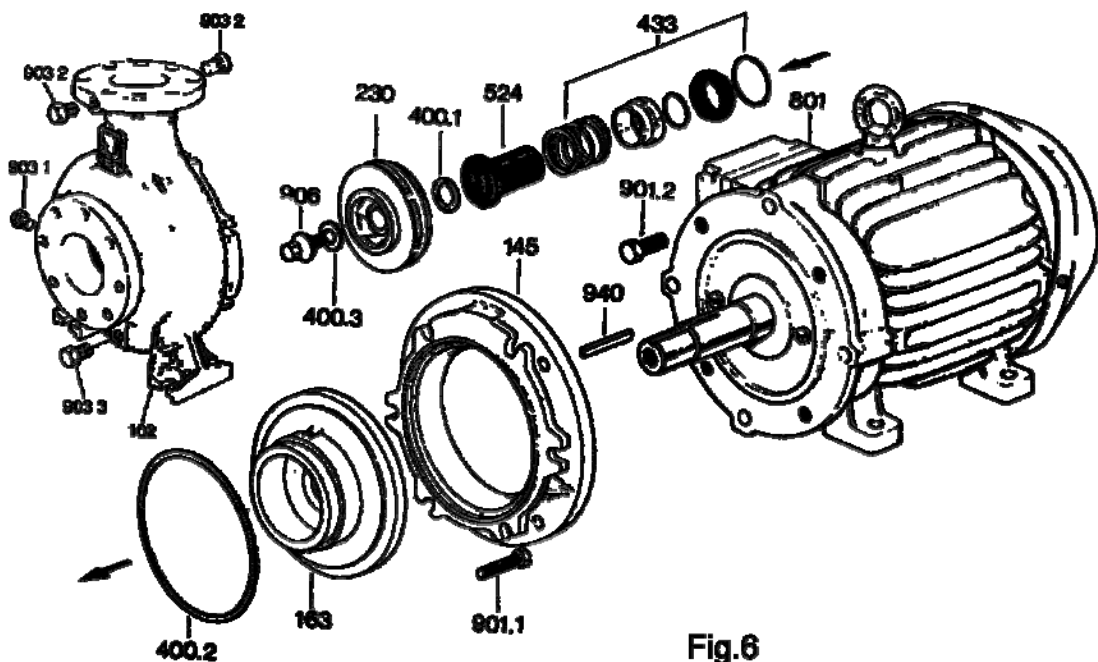


Fig.6

16. Electric Motor Installation And Operating Instructions

When installing the electric motor, follow these important recommendations carefully:

- Verify rated voltage and frequency
- Environmental temperature not higher than 104°F (40°C) 1)
- Location protected from direct sun exposure
- Altitude not over 3,280 ft (1.000 m) 1)
- Correct power supply cable size
- Thermal protection switch application

In order to motor operate satisfactorily and with total efficiency, it is indispensable that these and the following conditions are carefully met:

16.1 – The motor should perform satisfactorily with nominal load, provided that percent voltage variations are not over $\pm 10\%$ of the rated voltage. In the same way, the allowable frequency variation is $\pm 5\%$ of nominal frequency. Sum of frequency and voltage variations shall not be over 10%.

16.2 - The temperature measurement shall be performed preferably by the method of winding electric resistance variation.

16.3 - Besides the temperature and environment recommendations, it is very important to note that normal motors should not be installed at an altitude higher than 3,280 ft (1,000 m) above sea level, and location protected from direct sun exposure should be preferably complied with. 1)

16.4 - It is very important to meet the correct electric power supply, by using proper sizes for power supply cables. When proceeding to connection of the terminals, be sure of the network voltage and frequency. Check whether motor corresponds to these characteristics, then complete connection, in accordance with the scheme printed on the nameplate.

16.5 - It is recommended that a switch with thermal protection is applied, thus preventing possible burns because of lack of phase, overload or excessive voltage and frequency fluctuation. Check if current and rotation at full load do not deviate from the values mentioned on nameplate, which can be verified by means of electric measurement, through a voltammeter, to prevent overload and other abnormalities which could impair the motor life.

Note: 1) In case of altitude higher than 3,280 ft (1,000 m) and or temperature over 104°F (40° C), please consult KSB.

17. Electric Motor Maintenance And Lubrication

We recommend the periodical checking of switch contacts preventing worst consequences caused by oxidation, or bad contact of elements.

The electric motor bearings are supplied with sufficient grease for a long operation period.

According to the size and design, the motors may be provided with lubrication holes or with shielded bearings. To relubrify use tables 2 and 3.

CAUTION

DO NOT OVERLUBRIFY

Excess grease is more hazardous than lack of grease for bearings.

17.1 Grease Type

Manufacturer	Type
ESSO	Beacon 2
SHELL	Alvania R2
PETROBRÁS	Lubrax GM Industrial A2
ATLANTIC	Litholine 2
IPIRANGA	Isaflex EP2
TEXACO	Multifak 2

17.2 Lubrication Interval

Power (HP)	Interval (h)
2 to 3	8,000
4 to 7.5	6,000
10 to 25	4,500
30 to 40	3,000

Note: The information in this manual can be modified by KSB, without previous notice.

11.09.2007

A2744.8.1E/1

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